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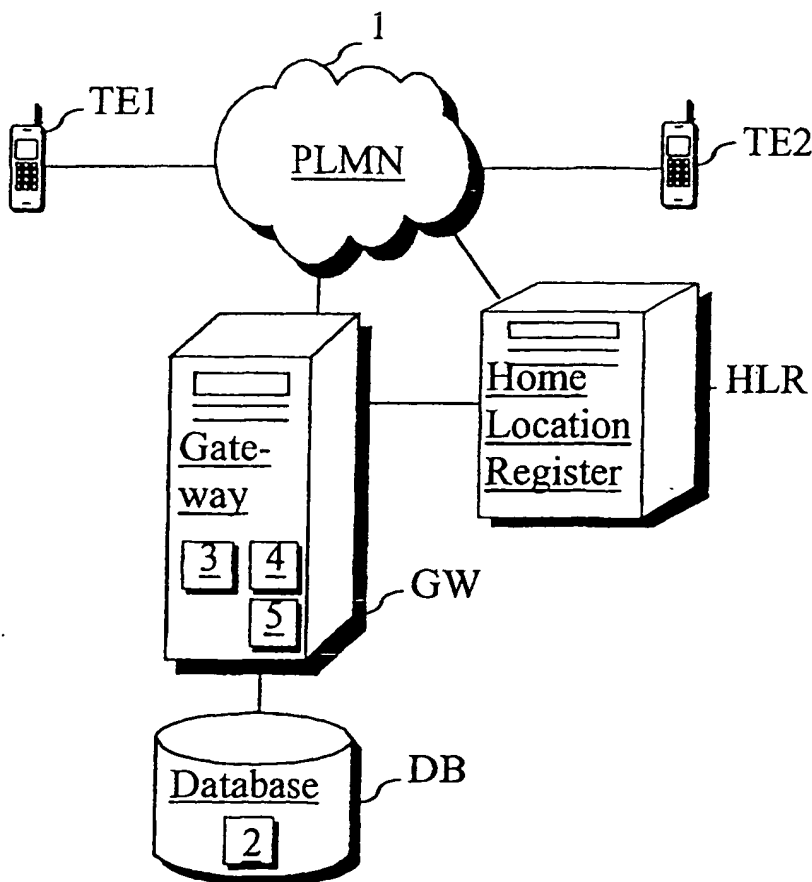
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(54) Title: TRANSMISSION OF A SHORT MESSAGE IN A TELECOMMUNICATION SYSTEM



(57) Abstract: The invention relates to a method and system for transmitting a short message in a telecommunication system comprising a location data register (HLR); a database (DB) for storing subscriber data; and a gateway (GW) which connects said location data register (HLR) and said database (DB) to said telecommunication network (1). In the method, a short message is created; the short message is sent to the telecommunication network (1); and the short message is directed via the telecommunication network (1) to the gateway (GW). In accordance with the invention, a database (DB) is maintained in which those subscribers are entered who have activated the short message forwarding service; it is checked from the database (DB) whether the receiver of the short message has activated the short message forwarding service; and in case yes, a routing information query is made by the gateway (GW) that is addressed to the location data register (HLR); and the short message is routed based on the data given by the routing information query.

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## TRANSMISSION OF A SHORT MESSAGE IN A TELECOMMUNICATION SYSTEM

### FIELD OF THE INVENTION

The present invention relates to telecommunications technology. In particular, the present invention relates to a method and system for transmitting a short message in a telecommunication system comprising a telecommunication network, a location data register, a database for storing subscriber data, a gateway that connects said location data register and said database to said telecommunication network. In the method, a short message is created, the short message is sent to the telecommunication network, and the short message is directed via the telecommunication network to the gateway.

### BACKGROUND OF THE INVENTION

Mobile communication networks such as, e.g. GSM networks (GSM, Global System for Mobile communications) have become very popular in a big part of the world. The advantage of mobile communication networks as compared to traditional fixed telephone networks is the overhead interface enabling a wide-ranging mobility.

In future, when talking about a mobile communication network it is advantageously used to mean a digital mobile communication network, e.g. a GSM network. Since the introduction of the digital mobile networks, a short message service (SMS, Short Message Service) has been a part of the services provided. The short message service function allows the mobile subscriber to send text messages that contain up to 160 characters from his or her terminal device, e.g. to another subscriber who has got a terminal device capable of receiving short messages at his or her disposal.

At present, the transmission system of short messages does not enable short message forwarding to another subscriber number. By this is meant a feature that in the case of a regular call would be called as  
5 call transfer. Short message forwarding is not possible at the moment because it is not possible to receive the short message forwarding information (the forwarded-to number) from the home location register (HLR) by means of signaling meant for short messages  
10 (SendRoutingInfoForSM message).

#### OBJECTIVE OF THE INVENTION

The objective of the invention is to eliminate or at least significantly alleviate the problems  
15 mentioned above. One specific objective of the invention is to disclose a new kind of method and system that enable the forwarding of a short message sent to a mobile communication network, e.g. to another subscriber number, which is preferably a MSISDN number  
20 (MSISDN, Mobile Station ISDN Number).

As for the features characteristic of the invention, reference is made to them in the claims.

#### BRIEF DESCRIPTION OF THE INVENTION

25 The system in accordance with the invention relates to transmission of short messages in a telecommunication system. In the invention, the new functionality relating to forwarding of a short message is implemented by the gateway. The gateway contains such  
30 progressive features that the standard components of a mobile communication network do not include. As concerns the functionality, essential is the fact that the gateway enables signaling between different network components without the actual network components  
35 having the ability to communicate with each other.

The telecommunication system comprises a telecommunication network, a location data register, a database for saving subscriber data, a gateway which connects said location data register and said database  
5 to said telecommunication network.

In the method, a short message is created, and the short message is sent to the telecommunication network. The short message is directed via the telecommunication network to the gateway. In accordance  
10 with the invention, a database is maintained in which those subscribers are entered who have activated the short message forwarding service. From the database it is checked whether the receiver of the short message has activated the short message forwarding service.  
15 The checking is advantageously done by the gateway. A short message forwarding service may mean the same as call forwarding unconditional (CFU). This means that an activated unconditional call forwarding concerns short messages as well. The forwarding service is ac-  
20 tivated, if the user has set it, e.g. on his terminal device. If the short message forwarding service has been activated, a routing information query is made that is addressed to the location data register. The routing information query is advantageously a  
25 SendRoutingInfo message.

It is to be noted that in a normal transmission situation of a short message the short message service centre sends the location data register, e.g. a SendRoutingInfoForSM message to serve as the routing  
30 information query. In response to the routing information query made by the short message service centre not a subscriber number as indicated by the message forwarding service is received, although the call forwarding unconditional service would have been acti-  
35 vated. Because of this fact, the SendRoutingInfo message is used as the routing information query. If the subscriber has activated the short message forwarding

service, then in response to the aforementioned routing information query, a forwarded-to number as shown by the forwarding service is returned. When the routing information has been found out, the short message  
5 is routed based on the routing information received from the location data register to the relevant subscriber.

The subscriber sets the short message forwarding service using, e.g. a call forwarding unconditional service. According to this, the subscriber dials, e.g. the following character combination:  
10 \*\*21\*area code; telephone number# (handset key). This activates the forwarding service, and the activating data of the CFU is entered in the home location register.  
15 ter.

The gateway plays an essential role in the SMS forwarding in implementing the signaling required for the transfer and the logic in between the network components. In addition, the gateway is responsible  
20 for eliminating incompatibility problems in between different network interfaces.

The gateway supports different protocols, which enables signaling between different network elements so that the actual network elements would be  
25 able to communicate with each other. Further, by means of the gateway it is possible to implement signaling which differs from the normal standard signaling. An example of this signaling is the SendRoutingInfo message in conjunction with the short message forwarding.

30 In an embodiment of the invention, the short message is routed normally further to the original receiver of the short message, if the short message forwarding service is not activated.

The system in accordance with the present invention comprises data records in which those subscribers are entered who have activated the short message forwarding service, and a checker for checking  
35

the activity of the short message forwarding service from the database. Further the system comprises a query maker for making the routing information query addressed to the location data register, and a transmitter for routing the short message based on the data given by the routing information query.

In one embodiment of the invention, the database is an internal database of the gateway. In another embodiment, the database is an external database attached to the gateway.

In an embodiment of the invention, the database is a location data register or an external or internal database attached to the location data register.

In an embodiment of the invention, the telecommunication network is a mobile communication network, e.g. a GSM network.

In an embodiment of the invention, the location data register is the home location register of the mobile communication network.

In an embodiment of the invention, the gateway is the short message service centre (SMSC) of the mobile communication network.

Thanks to the present invention, it is possible to direct short messages to another subscriber number, which is preferably a MSISDN number. The invention makes it possible to implement a same kind of functionality as the call transfer in a telephone network.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the following section, the invention will be described in detail by way of examples of its embodiments, in which

Fig. 1 represents an advantageous system in accordance with the invention.

Fig. 2 represents an advantageous example of the function of the system in accordance with the invention.

Fig. 3 represents an advantageous system that implements the forwarding of a short message,

Fig. 4 represents an advantageous system that implements the forwarding of a short message,

Fig. 5 represents an advantageous system that implements the forwarding of a short message, and

Fig. 6 represents an advantageous signaling diagram describing the function of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

The system as illustrated in figure 1 comprises terminal devices TE1 and TE2 as well as a telecommunication network 1. In this example, the telecommunication network is a mobile communication network (PLMN, Public Land Mobile Network). The terminal devices are preferably mobile stations. The mobile stations have been connected to the public land mobile network, e.g. via a radio interface. The system also comprises a gateway GW, a home location register HLR, and a database DB. Both the gateway and the home location register have been connected to the public land mobile network. In addition, the gateway has been connected to the home location register and the database.

The gateway GW comprises a checker 3 for checking the activity data of the forwarding service from the database DB. By means of the query maker 4 a routing information query is made that is addressed to the location data register HLR. By means of the transmitter 5 the short message is routed based on the data given by the routing information query.

The database DB comprises data records 2 in which those subscribers have been entered who have activated the short message forwarding service.



The checker 3, query maker 4, and transmitter 5 are preferably implemented by means of program blocks with the aid of the computer.

Fig. 2 is an advantageous example illustrating the function in accordance with the invention. The gateway GW means in this context a server computer on which a piece of software has been made that supports the GSM system and the signaling protocols required in it. The gateway GW may comprise, e.g. the following components and functions:

- the databases required
- computer components
- signaling components, e.g. SS7, Signaling System number 7)
- the software required (for instance, the service creation, performing and management environment, description of services)
- signaling protocols (INAP, MAP, TCAP, TCP/IP; INAP, Intelligent Network Application Part; MAP, Mobile Application Part; TCAP, Transaction Capabilities Application part; TCP/IP, Transmission Control Protocol, Internet Protocol)

In this example, the gateway GW has been connected to the public land mobile network, or it is a part of the public land mobile network. The gateway receives the short message from a component of the public land mobile network, arrow 20. The component is, e.g. a short message service centre or a mobile services switching centre (MSC). The gateway checks either from an external or internal database DB whether the subscriber B has activated the SMS forwarding service, double arrow 21. If the B subscriber has activated the forwarding service, the gateway requests the home location register HLR for the routing information by means of a MAP SendRoutingInfo message, arrow 22. If the B subscriber has activated the forwarding service, the home location register returns

the forwarded-to number to the gateway instead of the roaming number. The forwarded-to number is the number where the B subscriber has set his or her short messages should be forwarded to.

5           If the short message forwarding service has not been activated, the short message is sent normally further on to the subscriber number of the original B subscriber. Let it be noted that the receipt and forwarding of a short message may happen by means of a  
10 MAP protocol or some other protocol suitable for a short message transmission. The question may not even be about an interface between the network components, instead it may be a question about a primitive.

Fig. 3 is an advantageous example illustrating  
15           a system that implements the forwarding of a short message. In this example, the short message comes, as shown by arrow 30, to VMSC1 (VMSC, visitor mobile services switching centre). From it the short message is forwarded further on to the short message service  
20           centre SMSC. In this example, the short message service centre is provided with a feature that enables a triggering function for that subscriber data that has an activated SMS forwarding service. The triggering function is active only in the MT short messages (MT,  
25           Mobile Terminated). In other words, if the original subscriber B associated with the short message has activated the SMS forwarding service, the short message is directed further on to the visitor mobile services switching centre VMSC2. The visitor mobile services  
30           switching centre VMSC2 directs the short message further to the gateway GW. If the MSISDN number of the B subscriber associated with the short message is not included in the numbers to be triggered, the short message is transmitted further on normally without sending  
35           it at all to the gateway. In that case, the short message service centre finds out the routing information of the short message and sends the short message

further on to the visitor mobile services switching centre VMSC3.

When the short message comes to the gateway GW, the gateway requests the home location register HLR for the routing information by means of a MAP SendRoutingInfo message. The home location register returns the forwarded-to number to the gateway. The forwarded-to number is the number or other piece of routing information where the B subscriber has set his or her short messages should to be forwarded to.

As shown by arrow 32, the gateway transmits the short message back to the short message service centre SMSC. Now as the receiver of the short message appears a new MSISDN number differing from the original B subscriber number. The short message is directed further on to the visitor mobile services switching centre VMSC3, which takes care of sending the short message to the mobile station 31. The advantage of the solution described above is that the traffic going to the gateway is smaller than in a situation where all the short message traffic would be directed via gateway.

Fig. 4 describes an advantageous example of a system that implements the forwarding of a short message. In this example, the database associated with the forwarding of a short message as shown by figure 1 is located in the short message service centre SMSC because the short message service centre does not usually support interfaces to external databases. Further in this example, the functionality required by the forwarding of a short message is included in the short message service centre. A MT short message arrived in the public land mobile network, arrow 40, is directed via the visitor mobile services switching centre VMSC1 to the short message service centre. In this example the short message service centre has to be able to

handle subscriber-specific data and perform relatively complicated analyses.

The short message service centre SMSC finds out from the internal database whether the receiver of the short message has activated the short message forwarding service. The short message service centre sends the home location register HLR a MAP SendRoutingInfo message and receives in response from the home location register the relevant routing information. The message to be directed to the new B subscriber is sent further on to the visitor mobile services switching centre VMSC2, which takes care of sending the short message to the mobile station 41. The solution as described above has the advantage that it saves signaling capacity. This solution, however, requires adding of new features to the existing short message service centres.

Fig. 5 represents an advantageous example of a system that implements the forwarding of a short message. In this example, the functionality associated with the short message forwarding has been implemented in the gateway GW. In the system as illustrated in figure 5, the forwarding of a short message may happen in two different ways.

In the first case, all the MT short messages are routed to the gateway GW via the visitor mobile services switching centre VMSC1 and the short message service centre SMSC. The gateway finds out from the internal or external database whether the subscriber has activated the short message forwarding service. If the service has been activated, the gateway sends the home location register HLR a SendRoutingInfo message. Based on the routing information received from the home location register the gateway directs the short message further on to the visitor mobile services switching centre VMSC2, which takes care of directing the short message to the mobile station 52.

In the second case, the short message service centre SMSC sends the gateway GW only the MAP SendRoutingInfoForSM message and not the actual message part. The course of events as shown by this alternative has been described in figure 6. The solution as described in figure 5 requires big capacity of the gateway.

This solution provides the advantage that the implementation may be made independent of device supplier.

Fig. 6 represents an advantageous signaling example of the function of the system in accordance with the invention. The components of the system are the same as those illustrated in figure 5.

As illustrated in figure 6, the short message arrives in the short message service centre SMSC, arrow 60. The short message service centre sends the gateway GW a MAP SendRoutingInfoForSM message, arrow 61. It is to be noted that the short message service centre does not necessarily send the actual short message to the gateway, instead solely the MAP query. The gateway uses either an internal or external database in order to analyse whether the B subscriber has activated the short message forwarding service. If the service is activated, the gateway sends a routing information query, a SendRoutingInfo message, further on to the home location register HLR, arrow 62. If the short message forwarding service is not active according to the database, the gateway sends a SendRoutingInfoForSM message to the home location register HLR, arrow 64. The home location register HLR returns a forwarded-to number to the gateway, if the B subscriber has activated the SMS forwarding, arrow 63. If the SMS forwarding is not activated, the gateway sends a regular roaming number to the gateway, arrow 65. The gateway returns the routing information received from the home location register back to the short message

service centre, arrow 66. Based on the routing information received the short message service centre sends the short message further on to the visitor mobile services switching centre VMSC, arrow 67.

5           The advantage of this solution is that it may be implemented independent of device supplier.

          The invention is not restricted merely to the examples of its embodiments referred to above, instead many variations are possible within the scope of the  
10   inventive idea.

## CLAIMS

1. A method for transmitting a short message in a telecommunication system comprising:

- a telecommunication network (1);
- 5 a location data register (HLR);
- database (DB) for storing subscriber data;
- a gateway (GW) that connects said location data register (HLR) and said database (DB) to said telecommunication network (1);

10 which method comprises the following steps:

- a short message is created;
- the short message is sent to the telecommunication network (1);

the short message is directed via the telecommunication network (1) to said gateway (GW);

15 characterised in that the method further comprises the following steps:

- a database (DB) is maintained in which those subscribers are entered who have activated the short message forwarding service;
- 20

it is checked from the database (DB) whether the receiver of the short message has activated the short message forwarding service; and if yes, then

- a routing information query is made by the gateway
- 25 (GW) that is addressed to the home location register (HLR); and

the short message is routed based on the data given by the routing information query.

2. A method as defined in claim 1, characterised in that the routing information query to be made to the home location register (HLR) is a SendRoutingInfo message.

3. A method as defined in claim 1 or 2, characterised in that the short message is sent normally further to the original receiver of the short message, if the forwarding service is not activated according to the database (DB).

4. A method for transmitting a short message in a telecommunication system comprising:

- a telecommunication network(1);
- a location data register (HLR);
- 5 a database (DB) for storing the subscriber data;
- a gateway (GW) that connects said location data register (HLR) and said database (DB) to said telecommunication network (1);

which system makes it possible to create and receive short messages and transmit short messages by means of the telecommunication network (1) and the gateway (GW);

characterised in that the system comprises:

- 15 data records (2) in which those subscribers are entered who have activated the short message forwarding-service;

- a checker (3) for checking the activity data of the short message forwarding service from the database

20 (DB)

- a query maker (4) for making the routing information query to the home location register (HLR); and

- a transmitter (5) for routing the short message based on the data given by the routing information query.

25

5. A method as defined in claim 4, characterised in that the database (DB) is an internal database of the gateway (GW).

6. A method as defined in claim 4, characterised in that the database (DB) is an external database attached to the gateway (GW).

30

7. A method as defined in any one of the preceding claims 4 - 6, characterised in that the database (DB) is a location data register (HLR) or an external or internal database attached to the location data register (HLR).

35



8. A method as defined in any one of the preceding claims 4 - 7, characterised in that the telecommunication network is a public land mobile network.

5           9. A method as defined in any one of the preceding claims 4 - 8, characterised in that the location data register (HLR) is the home location register of the public land mobile network.

10           10. A method as defined in any one of the preceding claims 4 - 9, characterised in that the gateway (GW) is the short message service centre of the public land mobile network.

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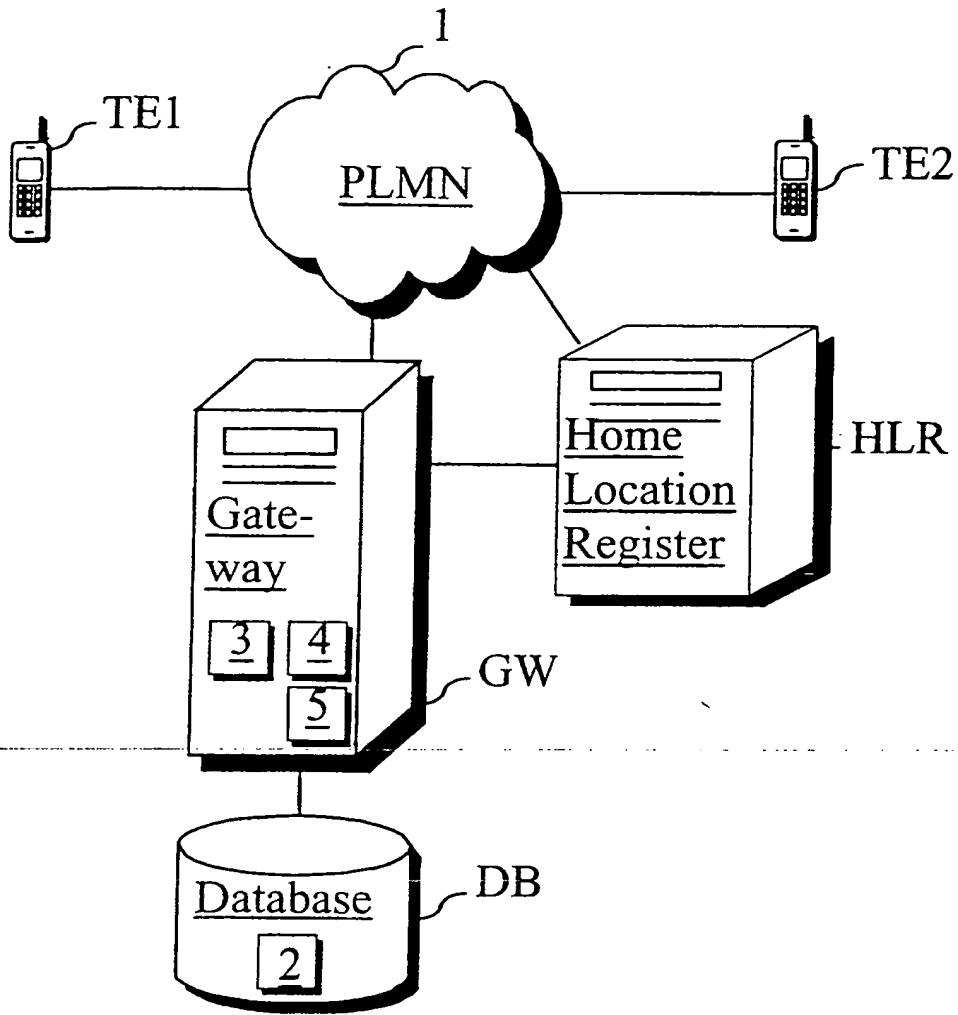


Fig. 1

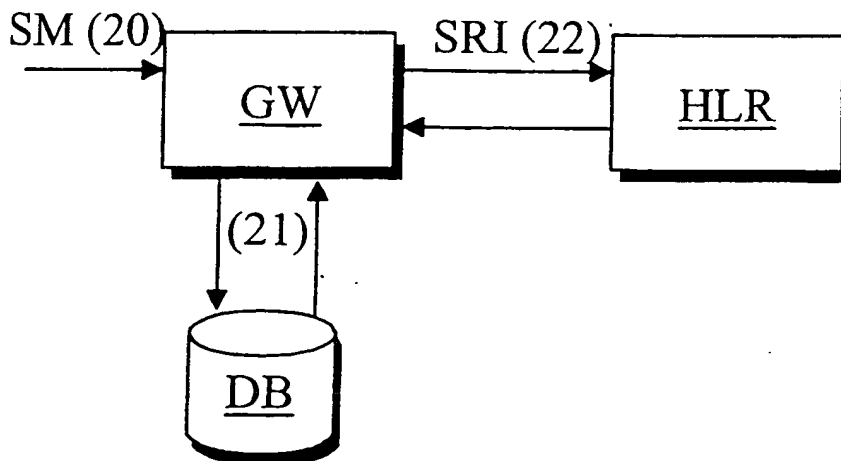


Fig. 2

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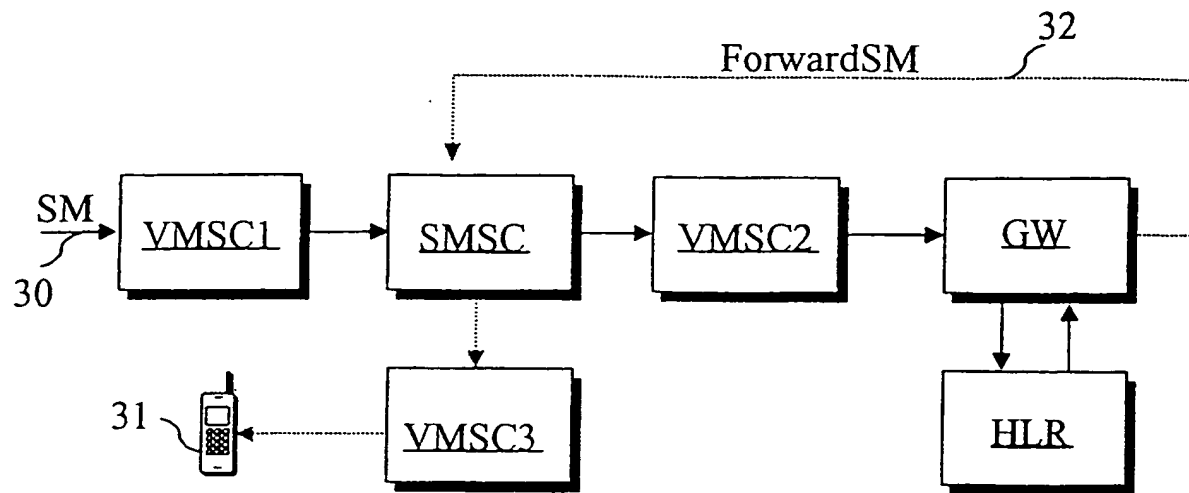


Fig. 3

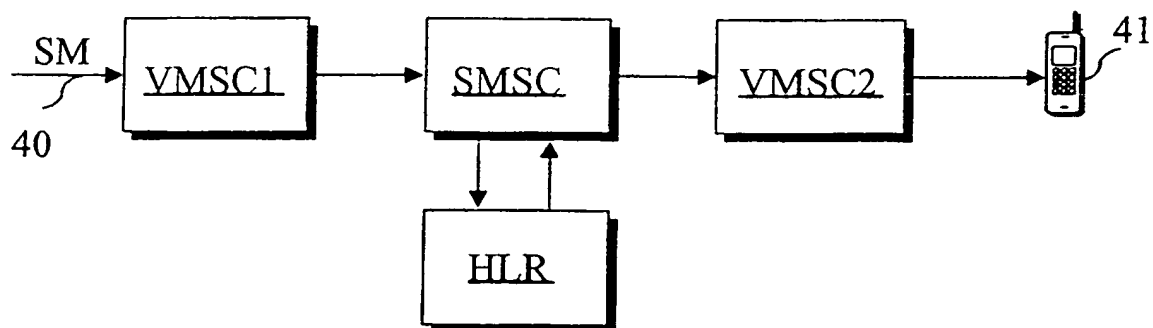


Fig. 4

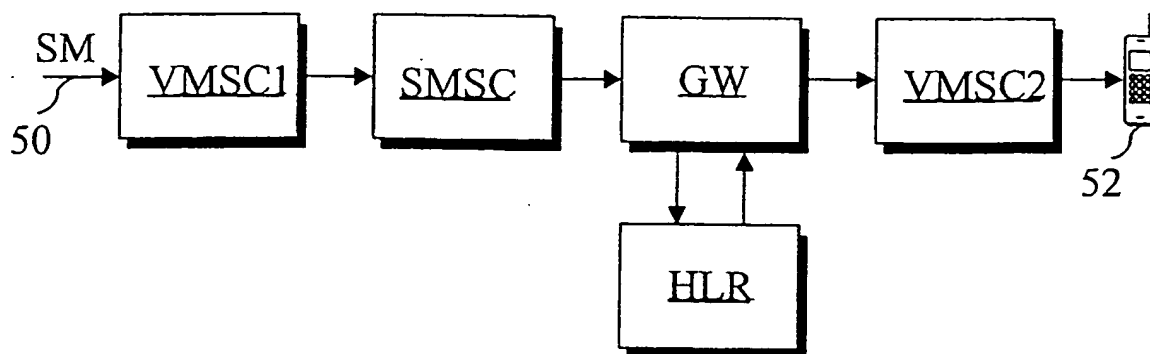


Fig. 5

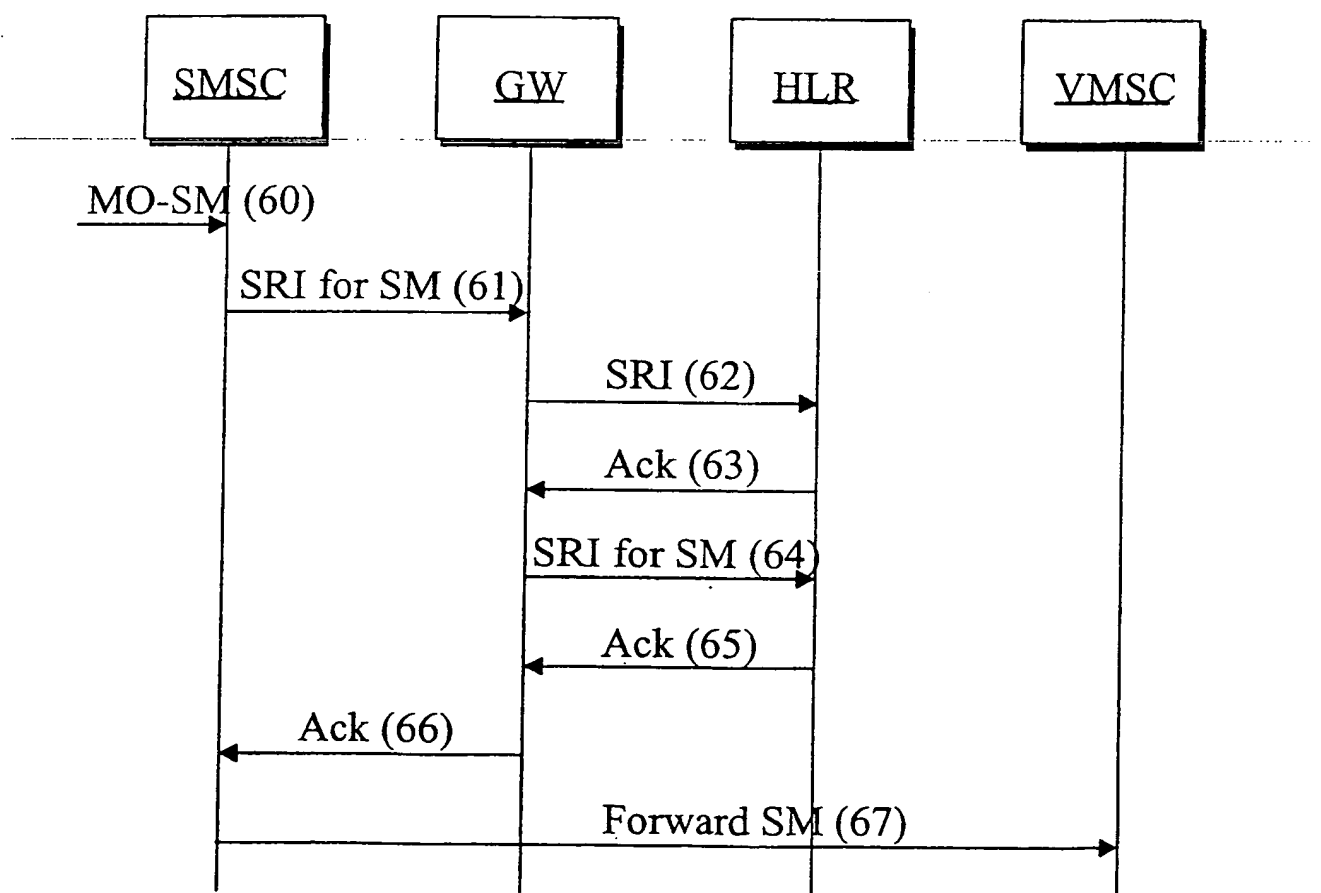


Fig. 6

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00808

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/22

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9832300 A2 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 23 July 1998 (23.07.98), page 4, line 10 - page 5, line 25	1-10
Y	EP 0851696 A2 (AT&T WIRELESS SERVICES, INC.), 1 July 1998 (01.07.98), see whole document	1-10
A	WO 9802007 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 15 January 1998 (15.01.98), abstract	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

12 January 2001

Date of mailing of the international search report

17 -01- 2001

Name and mailing address of the ISA/

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### Information on patent family members

International application No.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9832300 A2	23/07/98	AU 5684498 A BR 9807078 A US 6108559 A	07/08/98 18/04/00 22/08/00
EP 0851696 A2	01/07/98	BR 9706412 A CA 2221666 A JP 10200966 A NO 975935 A	25/05/99 24/06/98 31/07/98 25/06/98
WO 9802007 A1	15/01/98	AU 717555 B AU 3638797 A CN 1230323 A DE 19781921 T FI 990030 A GB 2330489 A,B US 5946630 A	30/03/00 02/02/98 29/09/99 08/07/99 05/03/99 21/04/99 31/08/99